

PATENT SPECIFICATION



Application Date: April 13, 1928. No. 10,929/28. **315,457**

Complete Left: Dec. 17, 1928.

Complete Accepted: July 15, 1929.

PROVISIONAL SPECIFICATION.

Improvements in or relating to Electric Couplings.

We, A. REYROLLE & COMPANY LIMITED, a Company registered under the Laws of Great Britain, of Hebburn-on-Tyne, in the County of Durham, and GERALD RICHMOND WILSON, British Subject, of Dalham, Southlands, Newcastle-upon-Tyne, in the County of Northumberland, do hereby declare the nature of this invention to be as follows:—

10 This invention relates to electric couplings, particularly to those of the plug and socket type, and has for its object to provide an improved construction for such couplings particularly but not exclusively adapted for use in such places as mines where it is necessary to prevent any risk of explosion due to the exposure to the surrounding atmosphere of an arc which may be caused when contact is broken between the two separable parts of the coupling.

15 In an electric plug and socket connector according to this invention the two separable parts are so constructed that after an initial separating movement which breaks electrical contact between them the contacts remain shielded from the surrounding atmosphere and the two parts cannot be further separated so as to expose the contacts without first carrying out an intermediate operation or movement which releases the parts and allows their complete separation.

20 With such an arrangement it is not possible to separate the parts with one direct movement but a delay or pause necessarily takes place between the breaking of the electrical contacts and their exposure, time being thus allowed for any arc which may have formed across these contacts to die out before they are exposed.

25 The construction of the two separable parts is preferably such that they are constrained by reason of the engagement between them to move in two distinct directions as they are brought together or separated. For example, when the contacts are in the "closed" position and are to be opened, separation of the two parts may be effected first by a relative movement in an axial direction until the contacts are broken after which further

axial movement is prevented, the contacts remaining shielded in a closed chamber, until a relative rotary movement has been given to the two parts when they can be finally separated from each other by a further axial movement and the contacts exposed.

30 To this end each of the separable parts may be surrounded by a casing the two casings being telescopic and the engagement between them being such that before they can be separated two axial movements with an intermediate rotary movement must take place. A locking ring or similar device may be provided to lock the two casings together when the two parts are fully engaged and prevent their accidental partial separation by a pull on the cable or other cause.

35 The engagement between the two casings may be effected by providing one of the separable parts with one or more projections spaced apart so as to co-operate with similarly spaced recesses in the other separable part, the projections and recesses being so disposed as only to allow separation and reengagement of the parts by the required axial and rotary movements. Further, in order to assist the coupling and uncoupling of the two parts the two casings may be externally marked in such a manner that the relative positions of the two parts necessary to effect registration of the projections of one part with the recesses of the other part can be readily obtained for each stage of the operation.

40 In a preferred construction according to this invention the plug member comprises a block of insulating material which carries the pin plugs and which is secured within one end of a metal casing or sleeve surrounding and projecting beyond the pins. One end of this casing is internally threaded to receive a block through which the conductors pass to the pins and the other end (that projecting beyond the pins) is provided with two internal ribs disposed diametrically opposite to each other near the opening of the casing. Within this projecting portion of the casing is further secured a key with its length parallel to the axis of the

55
60
65
70
75
80
85
90
95
100
105

casing and circumferentially displaced in relation to the ribs, the outer end of the key being axially displaced from the ribs in a direction nearer to the pin plugs.

- 5 The other separable part, or socket member, has a similar insulating block in which are mounted the pin plug sockets, this block being provided with a metal ring surrounding the block and having a beaded edge adapted to make scraping contact with the casing of the plug member. A metal casing or sleeve having an internal diameter corresponding to the external diameter of the plug member casing surrounds the insulating block and its sleeve so as to project beyond the contacts, and a cable grip through which the conductors pass to the pin plug sockets is screwed on to the closed end of this casing. The insulating block carrying the pin plug sockets has a recess cut in it adapted to receive the internal key in

the plug member casing and the beaded edge on the block sleeve has two openings disposed diametrically opposite to each other and adapted to receive the ribs in the plug member casing. The recess in the socket member is circumferentially spaced with respect to the openings in the beaded edge so as to correspond to the spacing of the key and ribs in the plug member. The outer casing of each separable part is marked so as to indicate the relative positions of the two parts necessary to cause the registration of the projections and recesses during separation and reengagement.

The ring or sleeve with the beaded edge previously mentioned may act in a way wellknown in itself, as an earthing ring.

Dated the 13th day of April, 1928.

KILBURN & STRODE,
Agents for the Applicants.

COMPLETE SPECIFICATION.

Improvements in or relating to Electric Couplings.

- We, A. REYROLLE & COMPANY LIMITED, a Company registered under the Laws of Great Britain, of Hebburn-on-Tyne, in the County of Durham, and GERALD RICHMOND WILSON, British Subject, of Dalham, Southlands, Newcastle-upon-Tyne, in the County of Northumberland, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

- This invention relates to electric couplings, particularly to those of the plug and socket type, and has for its object to provide an improved construction for such couplings particularly but not exclusively adapted for use in such places as mines where it is necessary to prevent any risk of explosion due to the exposure to the surrounding atmosphere of an arc which may be caused when contact is broken between the two separable parts of the coupling.

- 65 An electric plug and socket connector according to this invention has each of its separable members surrounded by a casing, the two casings being telescopic and the construction of the connector being such that before the two casings are separated two axial movements with an intermediate rotary movement must take place, the first axial movement breaking the electrical circuit, the intermediate movement providing a pause and the second axial movement effecting the separation of the casings.

A locking ring or similar device may be provided to lock the two casings together when the two parts are fully engaged and prevent their accidental partial separation by a pull on the cable or other cause.

The engagement between the two casings may be effected by providing one of the separable parts with one or more projections spaced apart so as to co-operate with similarly spaced recesses in the other separable part, the projections and recesses being so disposed as only to allow separation and reengagement of the parts by the required axial and rotary movements. Further, in order to assist the coupling and uncoupling of the two parts the two casings may be externally marked in such a manner that the relative positions of the two parts necessary to effect registration of the projections of one part with the recesses of the other part can be readily obtained for each stage of the operation.

A preferred construction according to the invention will now be described with reference to the accompanying drawings, in which

Figure 1 shows an elevation partly in section and partly broken away with the plug and socket in the closed position.

Figure 2 is a perspective view of the plug,

Figure 3 is a perspective view of the socket with its outer casing removed, and

Figure 4 is an elevation of the plug and socket during separation.

Referring to Figures 1 and 2, the plug

member comprises a block A of insulating material which carries the pin plugs A¹ and is surrounded by a metal casing or sleeve B which projects beyond the end of the pins A¹. One end of this casing B is internally threaded at B¹ to receive a block C by means of which the insulating block A is retained in position in the sleeve B and through which conductors are led to screws A² forming part of the pins A¹. The end of the casing or sleeve B which extends beyond the pins is provided with two internal circumferential ribs B² disposed at the end of the casing and diametrically opposite one another and also with a key B³ the axis of which is parallel to the axis of the casing. The key B³ is circumferentially displaced with respect to the ribs B² and is of such a length that the distance between its outer end and the end of the casing is greater than the axial depth of the ribs B².

The socket as shown in Figures 1 and 3 has an insulating block D in which are mounted the pin sockets D¹ and which is fixed to a cylindrical supporting block E by means of the studs D² extending through the block D. A metal sleeve F surrounds the block D and is held in position by an inner circumferential flange F¹ which fits in a suitable recess in the block D. A stud E¹ which screws into the block E has a projecting head which engages a recess in the flange F¹ and prevents rotation of the sleeve F.

The sleeve F is provided at its outer end with a beaded edge F² which is adapted to make a scraping contact with the inner surface of the sleeve B of the plug so as to provide an earthing connection between them and has an axial depth which is slightly less than the distance between the end of the key B³ and the inner edge of the ribs B² of the plug. There are two diametrically opposite openings F³ in the beaded edge F² corresponding to the ribs B² of the sleeve B of the plug. The insulating block D has a recess D³ adapted to receive the key B³ of the plug member so circumferentially spaced with respect to the openings F³ that when the plug is inserted with the ribs B² engaging in the openings F³, the slot D³ is not in line with the key B³. Preferably in order to avoid cutting away the beaded edge F² except at the two openings F³ the slot D³ is arranged as shown in Figure 3 in line with one of the openings F³.

The supporting block E of the socket is screwthreaded at E² so as to fit into an outer metal casing G having an internal diameter such that it will slide over the sleeve B of the plug. This outer casing G projects beyond the end of the insu-

lating block D and when the plug and socket are in the closed position abuts against a circumferential rib B⁴ on the sleeve B of the plug.

In order to retain the plug and socket in the closed position a locking ring H (Figure 1 and 4) is provided which has a flange H¹ engaging the outer side of the rib B⁴ and is screwthreaded at H² to engage with a corresponding screwthreaded portion G¹ of the outer casing G. A ring J is also arranged to screw on the casing at G¹ and is formed so as to interlock with the ring H and thus protect the screwthread G¹, the ring J being retained in position by a stud J¹.

The block E is screwthreaded at E³ for a cable grip K which holds the conductors connected to the sockets.

The plug is inserted on the socket with the ribs B² opposite the recesses F³ but the pins will not engage in the socket as the end of the key B³ is not opposite its slot D³ and furthermore it engages the rib F² and prevents further movement of the plug. It is therefore necessary to rotate the plug until the key B³ is in alignment with the slot D³ in which position the pins are opposite the sockets and the plug can be pushed home.

In order to separate the plug and socket, movements of the plug which are the converse of those above described, must be made. Thus the plug is first moved axially as a result of which the pins A¹ are withdrawn from the sockets D¹ to break electrical contact, and the key B³ is moved out of its slot D³. The two parts cannot, however, be completely separated as the beaded edge F² engages the inner edges of the ribs B². The plug is therefore rotated in the socket until the ribs B² are in alignment with the recesses F³ after which further axial movement permits the parts to be separated.

In order to facilitate the insertion and removal of the plug the socket is provided with a registering line L (Figure 4) and the plug is marked with an arrow having a tail M with which the mark L must be in line when the plug is inserted, a middle portion M¹ indicating the direction and amount which the plug must be rotated in order to bring the key B³ into alignment with the slot D³ and a head M² with which the mark L must be in line in order to push the plug into its final closed position.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. An electric plug and socket con-

nector having each of its separable mem-
 bers surrounded by a casing, the two
 casings being telescopic and the construc-
 tion of the connector being such that
 5 before the two casings are separated two
 axial movements with an intermediate
 rotary movement must take place, the
 first axial movement breaking the elec-
 trical circuit, the intermediate movement
 10 providing a pause and the second axial
 movement effecting the separation of the
 casings, marks or like indicating means
 being preferably arranged on the casings
 to indicate the registering position of the
 15 separable parts.

2. An electric plug and socket connector
 as claimed in Claim 1, in which the
 separable members are provided with co-
 operating projections and recesses which
 20 allow separation and reengagement of the
 members only by the axial and rotary
 movements.

3. In a plug and socket connector the
 combination with two insulating blocks
 25 carrying the plugs and sockets respec-
 tively of metallic casings or sleeves sur-

rounding the blocks and adapted to fit
 telescopically into one another so that
 electrical connection between the plugs
 and sockets is made or broken within a
 30 closed space, a key on one casing being
 arranged to engage a recess in the other
 casing when the plugs and sockets are
 engaged and two projections on the one
 casing co-operating with two further
 35 recesses on the other casing to permit the
 complete separation of the two parts of
 the connector when, after an initial axial
 separating movement in which the key
 disengages from its recess and the plugs
 40 and sockets separate, the two parts are
 rotated relatively to bring the two pro-
 jections into alignment with their co-
 operating recesses.

4. The electric plug and socket con-
 45 nector substantially as described with
 reference to the accompanying drawings.

Dated this 17th day of December, 1928.

KILBURN & STRODE,
 Agents for the Applicants.

[This Drawing is a reproduction of the Original on a reduced scale.]

